

CORRESPONDENCE.

PRIMOGENITURE AND ABNORMALITY: A POSSIBLE FALLACY.

Probably the earliest observation that consumption seemed to pick out the eldest born for its victims was made in 1906 by the present writer at the Crossley Sanatorium. For the purpose of mathematical confirmation, the data were offered to Professor Pearson, who kindly examined them. The result was *A First Study of the Statistics of Pulmonary Tuberculosis*, in which especial incidence of consumption upon first and second born children was described; the only related observation quoted being from an article in *Biometrika* (on the inheritance of duration of life) that "the elder adult sister and adult brother live on an average four years longer than the younger adult sister or brother."

Following this brochure on consumptives there came, also from the biometric side, two others in which I had no part: on lunatics and on criminals. In both classes (the figures for the latter may be found in Pearson's Boyle Lecture) very much the same sort of incidence was described, while later a third, albinism, was added.

Meanwhile, looking round for a larger material of consumptives upon which to test further the hypothesis, I had found it in five German works¹ and in some further pedigrees of my own. In an article (*The Lancet*, Oct. 7th, 1911) I showed that all save one of these sources yielded on analysis special incidence of consumption upon first and second born children. A bibliography of the subject was appended, going as far back as 1866, giving authors who, I now found, had asserted eldest born incidence amongst idiots, amongst criminals, and in men of genius. The last observation came from that distinguished pioneer in other fields, Dr. Havelock Ellis, who was the first to posit a multiple abnormal tendency on the part of the eldest child.

Of the chief of the foregoing investigations the exact figures are now given. To show them as succinctly as possible one contrasts two percentages—first, the percentage of eldest born children in the whole material of each inquiry; secondly, the percentage of eldest born children in the particular class examined. Thus Sir A. Mitchell² says: "Of all the children born in Edinburgh and Glasgow in 1855, 22·8 per cent. were first pregnancies, while of the 85 idiots 33 per cent. were first pregnancies."

So we can put it:—

Mitchell—

whole material	...	...	...	...	22·8 per cent.
special class (idiots)...	...	...	...	...	33 per cent.

Somewhat similarly, but preferably, as giving a closer comparison, may be expressed Langdon Down's³ data. Of 2,000 idiots he found 24 per cent. first born. Now the average size of the families these idiots came from was 6·91, the total number of children being therefore 13,820 (6·91 × 2,000). Among these 13,820 there were, of course, 2,000 oldest born, one to each family, making a percentage of 14·4.

Hence:—

Down—

whole material	...	...	...	...	14·4 per cent.
special class (idiots)...	...	...	...	...	24 per cent.

¹ Brehmer: *Die Aetiologie der chronischen Lungenschwindsucht* (1885). *Die Therapie der chronischen Lungenschwindsucht* (1889). Riffel: *Erblichkeit und Infektiösität der Schwindsucht* (1892). *Weitere Pathogenetische Studien* (1901) *Schwindsucht und Krebs* (1905).

² Edinburgh Medical Journal. Jan., 1866.
Mental Affections in Childhood. 1887.

Again, the 381 Crossley Sanatorium consumptives of whom I got particulars came from as many families, the members of which numbered in all 2,164. Now in 2,164 people the number of eldest born was 381, or 17·6 per cent. Amongst the 381 consumptives it was 113, or nearly 30 per cent.

And so :—

Pearson and Rivers—

whole material	...	...	...	17·6 per cent.
special class (consumptives)	...	...	...	29·6 per cent.

The method of comparison is now clear, and succeeding figures will be given without comment.

Heron¹—

whole material	...	...	...	16·5 per cent.
special class (lunatics)	...	...	...	23 per cent.

In Brehmer's cases—

whole material	...	...	...	14·8 per cent.
special class (consumptives)	...	...	...	18·2 per cent.

In Riffel's records—

whole material, "S. & K.,"	16·3 per cent. ;	"W. P. S.,"	16·3 per cent. ;	"E. & I.,"	20·1 per cent.
special class (deaths from phthisis), "S. & K.,"	20 per cent. ;	"W. P. S.,"	18 per cent. ;	"E. & I.,"	17 per cent.

Own Pedigrees—

whole material	...	...	...	15·8 per cent.
special class (consumptives)	...	...	...	20·1 per cent.

Among other findings which can be similarly stated is one kindly sent by Dr. Crzellitzer² :—

Crzellitzer—

whole material	...	...	...	18·9 per cent.
special class (high myopics)	...	...	...	28·6 per cent.

S. Hansen's results, published in the *EUGENICS REVIEW* last October, come out :—

whole material...	...	...	...	17 per cent.
special class (consumptives)...	...	...	...	28 per cent.

It becomes clear, then, that calculations such as the above have convinced many different people that the fate of the eldest born is to recruit the ranks of certain abnormal classes more often, proportionally, than do succeeding members of a family.

Now, as regards consumptives, from the outset I had suspected a mathematical fallacy. That was why, to begin with, high mathematical opinion was invited. In my examination of Riffel's data, too, I had taken the percentages of deaths from pneumonia, typhus, trauma and cancer, and compared them according to order of birth. Except cancer, they had not shown eldest born incidence. Crzellitzer, in a later paper,³ had done similarly with ocular defect other than hereditary high myopia; he had not found eldest born incidence here either. But the numbers of his "control" were very small; and my figures from Riffel, although larger, were not comparable with those derived from a material of living consumptives. Therefore having begun for another purpose a "control" consisting of normal persons of the working classes, mostly urban dwellers, and of an age distribution similar to that of sanatorium patients, I made order of birth one of the particulars on the schedule. After this

¹ A First Study of the Statistics of Insanity. 1907.

² *Wie vererben sich Augenleiden?* Gesellschaft für Soziale Medizin, Hygiene und Medizinalstatistik. Feb. 10, 1910.

Die Vererbung von Augenleiden. Berliner klin. Wochenschrift, 1912, No. 44.

was begun, Mr. Macaulay sent his pamphlet,¹ in which, considering only the biometric publications, he put down the described elder born incidence to a statistical fallacy connected with the ages of the subjects examined. And seemingly the findings in my control cases support his main contention. They relate to 259 subjects, both men and women,² coming from as many families, the members of which numbered 1,754. The percentages of eldest born are :—

whole material	...	...	...	...	14·7 per cent.
special class (the actual examinees)	...	...	...	...	22 per cent.

Other methods of calculation give a like result, as is shown in the following table :—

Crossley Sanatorium Consumptives—					Expected Number.	Actual Number.
1st born	...	...	...	...	67·1	113
2nd born...	...	...	...	...	64·4	79
Normals—						
1st born	...	...	...	...	38·2	57
2nd born...	...	...	...	...	37·3	41

The normals go on to show a large third born excess, which the consumptives do not; but both agree in a practical equality of actual and expected numbers in the case of the fourth born, and after that a counterbalancing deficiency for all born later than fourth; precisely the phenomenon invoked to prove not only a special incidence, according to order of birth, of consumption, but also of lunacy and of criminality; indeed a general pathological tendency connected with primogeniture.

These results in normal subjects require confirmation; but it must be remembered that statistical work, as that high authority Professor Pearson and others are always stating, is notoriously full of pitfalls. There was *a priori* likelihood that the eldest born would turn out consumptives and lunatics. We know from obstetricians that the eldest born child is shorter and lighter than succeeding children. Primiparae must be of immature age oftener than multiparae, and Körösi and Marro have described an unhappy fate for the scions of immature stock. My own experience in pig-breeding confirms that of others, namely that first litters are decidedly unsatisfactory compared with later ones. The child of a primipara is more subject to head injury during labour. Wallich and Fruhinsholz³ found that 16 out of 30 premature children brought to a Bicêtre clinic for nervous affections and other defects were eldest born. The well known tuberculous tendency of the insane would be well explained if being elder born were a part of the diatheses of both phthisis and lunacy. Similarly, too, the hardly less certain "variational diathesis" of men of genius; while all four classes, mentally unsound, men of genius, criminals, and consumptives, are just the ones which had been tentatively associated aforetime. Nevertheless, all such *a priori* arguments must, of course, yield to direct evidence, if that stand examination.

In conclusion, assuming that this excess of elder born in interrogated persons is, as we say, an artefact, to what can it be due? The question must be one for statisticians and mathematicians. Mr. Macaulay appears to think that the elder born will naturally be more often of the age at which phthisis appears than will the younger born. However, the average age of the normal examinees mentioned above hardly varies at all with order of birth. Another explanation is that first advanced by Von den Velden,⁴ who took the tuberculous families in two of Riffel's publications,

¹ *The Supposed Inferiority of First and Second Born Members of Families.* Montreal.

² In the *Lancet* article I have shown, what Crzelltizer for his part confirms, that elder born incidence has nothing much to do with sex.

³ *Annales de Gynécologie et d'Obstétrique.* November, 1911.

⁴ *Archiv für Rassen-und Gesellschafts-Biologie.* Juli-August, 1908.

and made out that while in them there were certainly more deaths from consumption amongst the three earlier born than in the remainder, yet this was due to smaller infantile mortality amongst these earlier born. In other words, proportionally more first, second, and third born infants would survive to grow up to adolescent and adult ages, the time at which phthisis shows itself; and so both the general adult population and the consumptive population are made up to a disproportionate degree of first, second, and third born. The criticism I have to make upon this does not now, after examining normals, differ much from what was said in the *Lancet* article before. These normals do indeed show (what, by the way, the whole of Riffel's data did not) a lessened infantile mortality amongst first, second, and third born children, just those which are present in apparent excess. But that lessened mortality seems too small to account wholly for that excess; and may itself be apparent only.

What would be instructive would be the histories of *completed* families, all of whose members had died; it may be because Riffel's records consisted partly of *completed* family histories, that they showed smaller eldest born incidence than other sources.

However, these are matters for statisticians rather than for clinicians. All that is here urged is that the evidence upon which an association of abnormality with primogeniture has been based, is open to cavil.

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NOTE.—Since writing the above, Mr. Cobb's article in the *EUGENICS REVIEW* for January, 1914, has come to my notice. In this he suggests a leash of fallacies to account for elder born incidence in consumptives, etc. Two of these, being of purely mathematical bearing, I am incompetent to discuss; but the third is inaccuracy of the data, particularly from a younger "sibling" forgetting a deceased elder one, and therefore wrongly reckoning himself or herself eldest born; and concerning this it might be said that it would not apply to many of the cases in the material mentioned above as "Own Pedigrees," since in them the parents of the subject were often questioned. Neither could it apply to the special class of idiots, for here by the nature of the case the subjects themselves could not have been the informants (see Mitchell's data, Down's data, and a more recent and unmentioned paper by Dr. Hunter). Good judges inform me that Mr. Cobb's mathematical attack upon elder born incidence seems so far the best directed one. That matter statisticians will no doubt soon decide. But if it be confirmed that the phenomenon obtains also in the case of normals, then the matter loses interest for clinicians and eugenisists—except as a warning against "uncompleted" families.